506320

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 October 2003 (30.10.2003)

PCT

(10) International Publication Number
WO 03/089720 A1

(51) International Patent Classification[7]: E02B 3/14

(21) International Application Number: PCT/KR02/00723

(22) International Filing Date: 19 April 2002 (19.04.2002)

(25) Filing Language: English

(26) Publication Language: English

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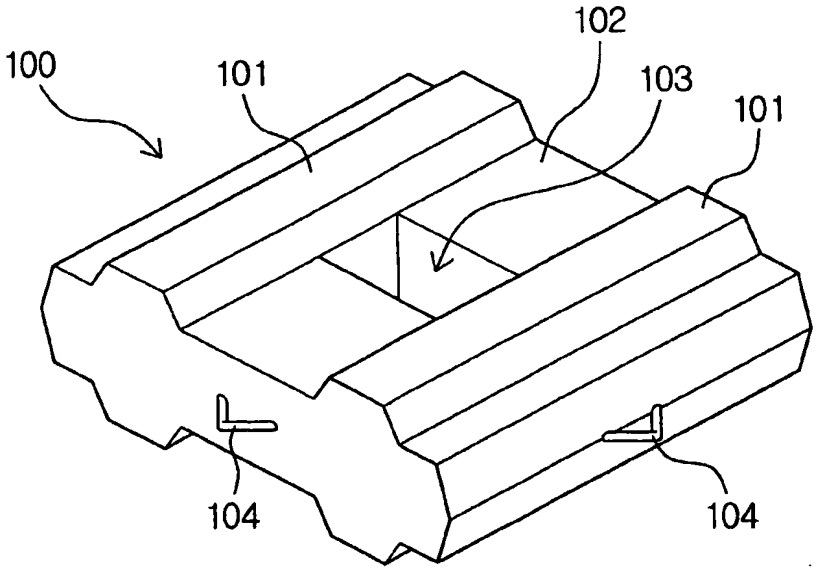
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** METHOD FOR CONSTRUCTING CHECK DAM OR FIRE PREVENTION DAM USING GEAR-TYPE BLOCK



(57) **Abstract:** A method for constructing a check dam or a fire prevention dam using a gear-type block comprises depositing a bottom mat for protecting weak ground or a mat for containing water on a prepared river bed of a river or a valley; piling a plurality of gear-type blocks such that adjacent blocks are connected together using connecting rings provided at the lateral parts of the block, and lower and upper blocks are engaged with each other by means of projections and grooves formed at the upper and lower parts of the block; and forming a block mattress on said bottom mat at upper and lower streams of the lower end of said dam structure by horizontal engagement of blocks.

WO 03/089720 A1

TITLE

METHOD FOR CONSTRUCTING CHECK DAM OR FIRE PREVENTION DAM USING GEAR-TYPE BLOCK

TECHNICAL FIELD

The present invention relates generally to a method for constructing a check dam or a fire prevention dam, and more particularly to a method for constructing a check dam using a gear-type block capable of storing soil and stones and discharging water through a space between blocks to prevent a flood disaster due to rising of a river route and a water level caused by incoming and accumulation of the soil and stones from a branch river to a main river, and a method for constructing a fire prevention dam using a gear-type block capable of providing an artificial water containing facility at a remote place to supply fire prevention water for early prompt suppression of a forest fire when it occurs, and also capable of providing a spawning and inhabitation ground for animals and plants at the waterside to contribute to the preservation of an ecosystem.

BACKGROUND ART

Generally, a river sill is a concrete beam with a gravity section. Such a sill is mainly constructed with underwater concrete by a field placing method. In the course of the field placing of the concrete, however, water pollution grows worse, and inhabitation environment for river fishes is destroyed. In addition, erosion occurs severely at the lower end of the sill after the construction of the sill has been completed. Especially, the sill may be damaged due to a flood, which requires repair or reconstruction of the sill.

In order to overcome the aforesaid drawbacks in carrying out such an

uniformed concrete placing method, there has been an attempt to propose a method for constructing a bank protecting wall using a bank protecting block, which has the advantage of natural purification, such as water improvement, to some extent. Nevertheless, consideration regarding the provision of a spawning and inhabitation ground for river fishes and vegetation environment for plants at the waterside is insufficient, which does not endow the river with vital force. Consequently, it is required to construct a bank protection facility capable of protecting the environment with the self-purification of the river and the preservation of an ecosystem.

Furthermore, if hydraulic properties of the river structural part, such as a sill, a check dam, or the like, and the ground connection part is not considered in case of the bank protection facility, soil and sand become washed away from the ground connection part by a flood, which leads to collapse of the banks. This is because sand or pebbles at the riverbed adjacent to the fixed concrete structure have a very low degree of a water current tolerance, resulting in that the sand or pebbles are washed away or eroded. Consequently, it is also required to provide a method for protecting a bank in consideration of bending resistance of a boundary between the protection bank and the river bed and reinforcement of the connection parts.

DISCLOSURE OF THE INVENTION

The present invention is disclosed in order to overcome the drawbacks caused in the bank protection works as mentioned above.

It is an object of the present invention to provide a method for constructing a check dam using a gear-type block capable of storing soil and stones and discharging water through a space between blocks since the check dam is constructed using the gear-type block of a prominence and depression structure to prevent a flood disaster due

to rising of a river route and a water level caused by incoming and accumulation of the soil and stones from a branch river to a main river.

It is still another object of the present invention to provide a method for constructing a fire prevention dam using a gear-type block capable of providing an artificial water containing facility at a remote place to supply fire prevention water for early prompt suppression of a forest fire when it occurs, and also capable of providing a spawning and inhabitation ground for animals and plants at the waterside normal times to contribute to the preservation of an ecosystem.

In order to accomplish the aforesaid object of the present invention, there is provided a method for constructing a check dam using a gear-type block, comprising the steps of:

(a) depositing a bottom mat for protecting weak ground on a prepared river bed of a river or a valley where the check dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed;

(b) piling a plurality of gear-type blocks in a form of a pyramid on said river bed where said bottom mat is deposited, each of said gear-type blocks including an upper part and an lower part having projections and a groove thereon respectively, said upper and lower parts being provided for engaging one of said piled blocks with another block when the piling step is performed, each of said gear-type blocks including a middle part having a through hole of a predetermined dimension formed therein, each of said gear-type blocks including four lateral parts each having a ring for connecting adjacent blocks formed thereon; and

(c) depositing a plurality of native rock-type blocks in the form of a block mattress on said bottom mat at upper and lower streams of the lower end of said dam

structure by connecting said native rock-type blocks together with said rings, each of said native rock-type blocks including irregular projections formed diagonally thereon, gaps defined by said projections in which soil is to be filled, and rings provided diagonally at the corners for connecting adjacent blocks.

In a preferred embodiment of the present invention, said adjacent blocks are connected together by fixing U-shaped bolts to said rings formed at the lateral parts of each block when said gear-type blocks are piled up in the form of a pyramid at the step (b).

Furthermore, said dam structure is constructed in the form of a pyramid such that a middle part of the structure is arranged at the level lower than either side part of the structure adjacent to either bank of the valley, which prevents any collapse due to pressure of enormous amount of water by letting a portion of the water out over the lower middle part if the volume of water kept in store is increased suddenly due to a localized torrential downpour.

In order to accomplish the aforesaid object of the present invention, there is also provided a method for constructing a fire prevention dam using a gear-type block, comprising the steps of:

(a) depositing a mat for containing water on a prepared river bed of a river or a valley where the fire prevention dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed;

(b) preparing a first vertical pileup of a plurality of gear-type blocks on said river bed where said mat for containing water is deposited, each of said gear-type blocks including an upper part and an lower part having projections and a groove thereon respectively, said upper and lower parts being provided for engaging one of said piled

blocks with another block when the piling step is performed, each of said gear-type blocks including a middle part having a through hole of a predetermined dimension formed therein, each of said gear-type blocks including four lateral parts each having a ring for connecting adjacent blocks formed thereon;

(c) depositing a mat for containing water at the outer surface of the containing water along said first vertical pileup of the structure;

(d) providing a second vertical pileup of a plurality of gear-type blocks same as said gear-type blocks used in the step (b) at the outer surface of the containing water along said first vertical pileup of the structure where said mat for containing water is deposited; and

(e) arranging said gear-type blocks in the form of a block mattress on said mat for containing water at upper and lower streams of the lower end of said dam structure obtained from said first and second vertical pileup of the structure by connecting said gear-type blocks together with said rings.

In a preferred embodiment of the present invention, said second vertical pileup of the gear-type blocks is provided in the step (d) such that a pileup surface at the lower stream of the structure is inclined at a predetermined angle.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will become apparent from the following description of preferred embodiments with reference to the accompanying drawings in which:

Fig. 1 is a perspective view showing the structure of a gear-type block employed in a method for constructing a check dam or a fire prevention dam using a gear-type block according to the present invention;

Fig. 2 is an illustration of a block mattress structure formed by connecting the gear-type blocks of Fig. 1 each other;

Fig. 3 is a perspective view showing the structure of a native rock-type block employed in a method for constructing a check dam using a gear-type block according to the present invention;

Fig. 4 is a front view showing a check dam constructed by a method for constructing a check dam using a gear-type block according to the present invention;

Fig. 5 is a cross-sectional view of the check dam of Fig. 4; and

Fig. 6 is a cross-sectional view showing a fire prevention dam constructed by a method for constructing a fire prevention dam using a gear-type block according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

A gear-type block or a native rock-type block employed in a method for constructing a check dam or a fire prevention dam will be described prior to the detailed description of the preferred embodiments of the present invention.

Fig. 1 is a perspective view showing the structure of a gear-type block employed in a method for constructing a check dam or a fire prevention dam using a gear-type block according to the present invention.

Referring to Fig. 1, a gear-type block 100 employed in a method for constructing a check dam or a fire prevention dam is of a rectangle in a plan section. At the upper and lower part of the block is formed a projection 101 and a groove 102, which is adjacent to the projection 101, respectively. When the blocks are deposited on

the surface of a river bed, the projection 101 and the groove 102, which constitute a prominence and depression structure, are embedded into the river bed to some degree so that the blocks withstand a running water and the safe deposit of the blocks are maintained, and the projection 101 and the groove 102 are engaged with each other when the blocks are piled up to keep the construction of the block structure secure. Furthermore, at the middle part of the block is formed a through hole 103 of a predetermined dimension, which decreases buoyancy when the block is sunk into the water and stabilize the river bed due to accumulation of soil and sand or small pebbles therein after the construction has been completed, and at four lateral parts of the block are provided steel rings 104 for connecting adjacent blocks respectively. In this case, the steel ring 104 is made of deformed bar, although a stainless steel pipe may be coated on the outer surface of the deformed bar or the ring may be made of stainless steel if the block is constructed under sea water (salt water).

Fig. 2 is an illustration of a block mattress structure formed by connecting the gear-type blocks of Fig. 1 each other. As shown in Fig. 2, the gear-type blocks 100 are connected with each other in a plane by the steel rings 104 to constitute a block mattress structure 200 of a predetermined dimension. At this time, the steel rings 104 are connected with each other by U-shaped bolts 110. Of course, other similar connecting means may be used.

Fig. 3 is a perspective view showing the structure of a native rock-type block employed in a method for constructing a check dam using a gear-type block according to the present invention.

As shown in Fig. 3, a native rock-type block 300 employed in a method for constructing a check dam using a gear-type block according to the present invention has irregular projections 301 formed diagonally thereon. Between the irregular projections

301 is formed gaps 302 in which soil is to be filled, and steel rings 303 are provided diagonally at the corners for connecting adjacent blocks. The native rock-type blocks 300 constructed as described above are connected with each other by connecting the steel rings 303 each other using U-shaped bolts, as in the gear-type block 100.

A method for constructing a check dam or a fire prevention dam using a gear-type block or a native rock-type block according to the present invention will be now described.

Fig. 4 and Fig. 5 show a check dam constructed by a method for constructing a check dam using a gear-type block according to the present invention; Fig. 4 is a front view and Fig. 5 is a cross-sectional view of the check dam.

Referring to Fig. 4 and Fig. 5, in accordance with a method for constructing a check dam using a gear-type block according to the present invention, a bottom mat 500 for protecting weak ground is deposited on a prepared river bed 400 of a river or a valley where the check dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed. In this case, the bottom mat 500 may be made of civil engineering fiber.

After the deposition of the bottom mat 500 has been completed, the gear-type blocks 100, which includes an upper part and an lower part having projections 101 and a groove 102 thereon respectively and being provided for engaging one of the piled blocks with another block when the piling step is performed, a middle part having a through hole 103 of a predetermined dimension formed therein, and four lateral parts each having a ring 104 for connecting adjacent blocks formed thereon, as shown in Fig. 1, are piled up in a form of a pyramid on the river bed where the bottom mat 500 is deposited.

At this time, the adjacent blocks are connected together by fixing the rings 104

formed at the lateral parts of each block using U-shaped bolts 110, preferably as in Fig. 2, when the gear-type blocks 100 are piled up in the form of a pyramid. And, the gear-type blocks are piled up such that the projection 101 and the groove 102 formed on the upper and lower parts of each block are engaged with each other.

Moreover, the dam structure is constructed in the form of a pyramid such that a middle part of the structure is arranged at the level lower than either side part of the structure adjacent to either bank of the valley, as shown in Fig. 4, which prevents any collapse due to pressure of enormous amount of water by letting a portion of the water out over the lower middle part if the volume of water kept in store is increased suddenly due to a localized torrential downpour.

After the formation of the dam structure has been completed as mentioned above, on the bottom mat 500 at upper and lower streams of the lower end of the dam structure are deposited native rock-type blocks 300, which includes irregular projections 301 formed diagonally thereon, gaps 302 defined by the projections in which soil is to be filled, and rings 303 provided diagonally at the corners for connecting adjacent blocks, as shown in Fig. 3, in the form of a block mattress by connecting the native rock-type blocks 300 together with the rings 303. At this time, the connection of the native rock-type blocks 300 is accomplished by connecting the steel rings 303 each other using the U-shaped bolts as in the connection of the gear-type blocks 100. As mentioned above, the native rock-type blocks 300 are deposited in the mattress structure at the upper and lower streams of the lower end of the dam structure in order to prevent any local erosion due to running water.

With the check dam constructed as described above, soil and stones are blocked by the dam structure, and water is discharged through a space between the gear-type blocks 100. Consequently, it is possible to prevent any flood disaster due to

reduction of the cross section through which the water passes and rising of a water level caused by incoming and accumulation of the soil and stones into mid-stream or downstream of the river. Furthermore, the soil filled in the gaps 302 formed on the native rock-type blocks 300 is connected to the ground of the river bed to provide an environment in which a water plant is vegetated.

Fig. 6 is a cross-sectional view showing a fire prevention dam constructed by a method for constructing a fire prevention dam using a gear-type block according to the present invention.

Referring to Fig. 6, in accordance with a method for constructing a fire prevention dam using a gear-type block, a mat 600 for containing water is deposited on a prepared river bed 400 of a river or a valley where the fire prevention dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed. In this case, the mat 600 for containing water may be made of non-woven fabric with no water permeability, such as polyester.

After the deposition of the mat 600 for containing water has been completed, a plurality of gear-type blocks 100 as shown in Fig. 1 are plied up vertically on the river bed 400 where the mat 600 for containing water is deposited. Then, a mat 600' for containing water is deposited along the outer surface of the containing water of the first pileup structure. The reason why the mat 600' for containing water is deposited is that the structure of the fire prevention dam must be able to contain and store the water unlike the check dam of Fig. 4 and Fig. 5.

After the deposition of the mat 600' for containing water has been completed, a plurality of gear-type blocks 100 same as the aforesaid gear-type blocks are piled up at the outer surface of the containing water of the first pileup structure where the mat 600' for containing water is deposited. At this time, the second vertical pileup of the gear-

type blocks is provided such that a pileup surface at the lower stream of the structure is inclined at a predetermined angle, which is for the sake of the structural stability of the piled dam structure.

After the first and second vertical pileup of the structure have been accomplished, the gear-type blocks 100 are arranged in the form of a block mattress, as shown in Fig. 2, on the mat 600 for containing water at upper and lower streams of the lower end of the dam structure obtained from the first and second vertical pileup of the structure by connecting the gear-type blocks together with the steel rings 104.

In the fire prevention dam constructed as described above, local erosion occurs at the front end of the upper stream of the fire prevention dam as the amount and speed of the flow increase. However, since each of the gear-type blocks 100 in the block mattress structure is connected with each other by the steel ring 104, the block mattress structure has vendibility due to self weight when the ground of the river bed is eroded locally. Consequently, some of the blocks 100 are inclined to a stable angle along to the slope of the eroded area, as shown in Fig. 6. As a result, any further erosion into the inner side of the fire prevention dam is prevented.

Meanwhile, the aforesaid fire prevention dam provides an artificial water containing facility at a remote place to shorten the distance and time for delivering water by a helicopter and thus supply fire prevention water for early prompt suppression of a forest fire when it occurs. As a result, the damage due to a forest fire is minimized. In addition, the fire prevention dam is used as a source for drinking water normal times, and provides a spawning and inhabitation ground for animals and plants at the waterside to contribute to the preservation of an ecosystem and protect wild animals.

INDUSTRIAL APPLICABILITY

With a method for constructing a check dam or a fire prevention dam using a gear-type block according to the present invention, it is possible to store soil and stones and discharging water through a space between blocks since the check dam is constructed using the gear-type block of a prominence and depression structure, thereby preventing a flood disaster due to rising of a river route and a water level caused by incoming and accumulation of the soil and stones from a branch river to a main river. Furthermore, it is possible to provide an artificial water containing facility at a remote place, thereby supplying fire prevention water for early prompt suppression of a forest fire when it occurs, and to provide a spawning and inhabitation ground for animals and plants at the waterside normal times to contribute to the preservation of an ecosystem.

WHAT IS CLAIMED IS:

1. A method for constructing a check dam using a gear-type block, comprising the steps of:

(a) depositing a bottom mat for protecting weak ground on a prepared river bed of a river or a valley where the check dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed;

(b) piling a plurality of gear-type blocks in a form of a pyramid on said river bed where said bottom mat is deposited, each of said gear-type blocks including an upper part and an lower part having projections and a groove thereon respectively, said upper and lower parts being provided for engaging one of said piled blocks with another block when the piling step is performed, each of said gear-type blocks including a middle part having a through hole of a predetermined dimension formed therein, each of said gear-type blocks including four lateral parts each having a ring for connecting adjacent blocks formed thereon; and

(c) depositing a plurality of native rock-type blocks in the form of a block mattress on said bottom mat at upper and lower streams of the lower end of said dam structure by connecting said native rock-type blocks together with said rings, each of said native rock-type blocks including irregular projections formed diagonally thereon, gaps defined by said projections in which soil is to be filled, and rings provided diagonally at the corners for connecting adjacent blocks.

2. The method as clamed in claim 1, wherein said adjacent blocks are connected together by fixing U-shaped bolts to said rings formed at the lateral parts of each block when said gear-type blocks are piled up in the form of a pyramid at the step

(b).

3. The method as clamed in claim 1, wherein said dam structure is constructed in the form of a pyramid such that a middle part of the structure is arranged at the level lower than either side part of the structure adjacent to either bank of the valley.

4. A method for constructing a fire prevention dam using a gear-type block, comprising the steps of:

(a) depositing a mat for containing water on a prepared river bed of a river or a valley where the fire prevention dam is to be constructed such that said mat is spread over the area broader than designed area of a bottom of the dam structure to be constructed;

(b) preparing a first vertical pileup of a plurality of gear-type blocks on said river bed where said mat for containing water is deposited, each of said gear-type blocks including an upper part and an lower part having projections and a groove thereon respectively, said upper and lower parts being provided for engaging one of said piled blocks with another block when the piling step is performed, each of said gear-type blocks including a middle part having a through hole of a predetermined dimension formed therein, each of said gear-type blocks including four lateral parts each having a ring for connecting adjacent blocks formed thereon;

(c) depositing a mat for containing water at the outer surface of the containing water along said first vertical pileup of the structure;

(d) providing a second vertical pileup of a plurality of gear-type blocks same as said gear-type blocks used in the step (b) at the outer surface of the containing water along said first vertical pileup of the structure where said mat for containing water is deposited; and

(e) arranging said gear-type blocks in the form of a block mattress on said mat

for containing water at upper and lower streams of the lower end of said dam structure obtained from said first and second vertical pileup of the structure by connecting said gear-type blocks together with said rings.

5. The method as clamed in claim 4, wherein said second vertical pileup of the gear-type blocks is provided in the step (d) such that a pileup surface at the lower stream of the structure is inclined at a predetermined angle.

Fig.1

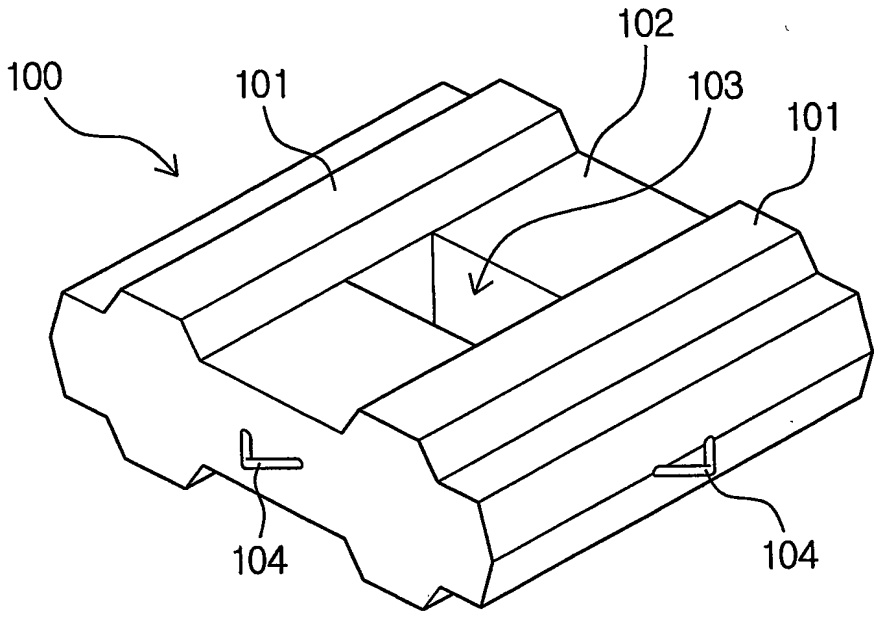


Fig.2

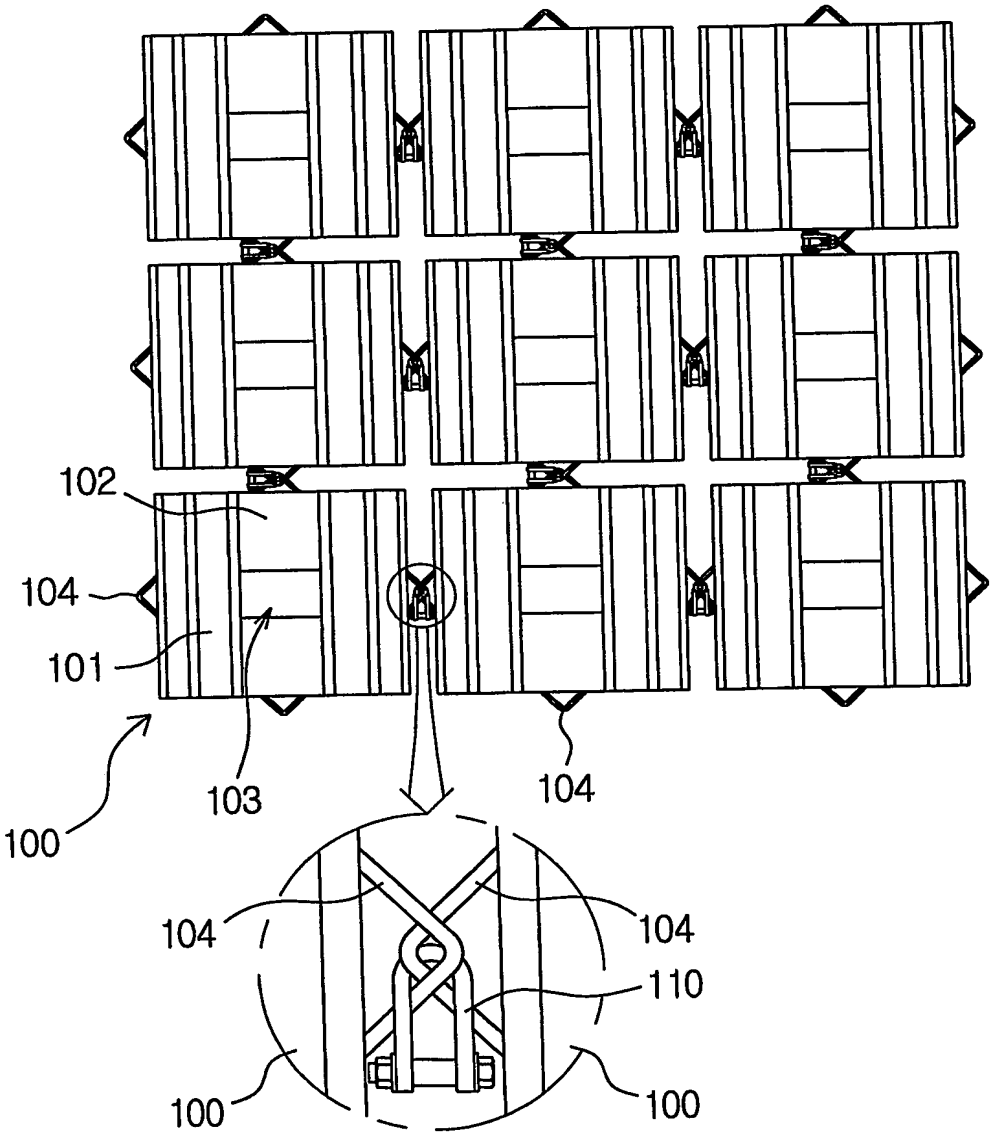


Fig.3

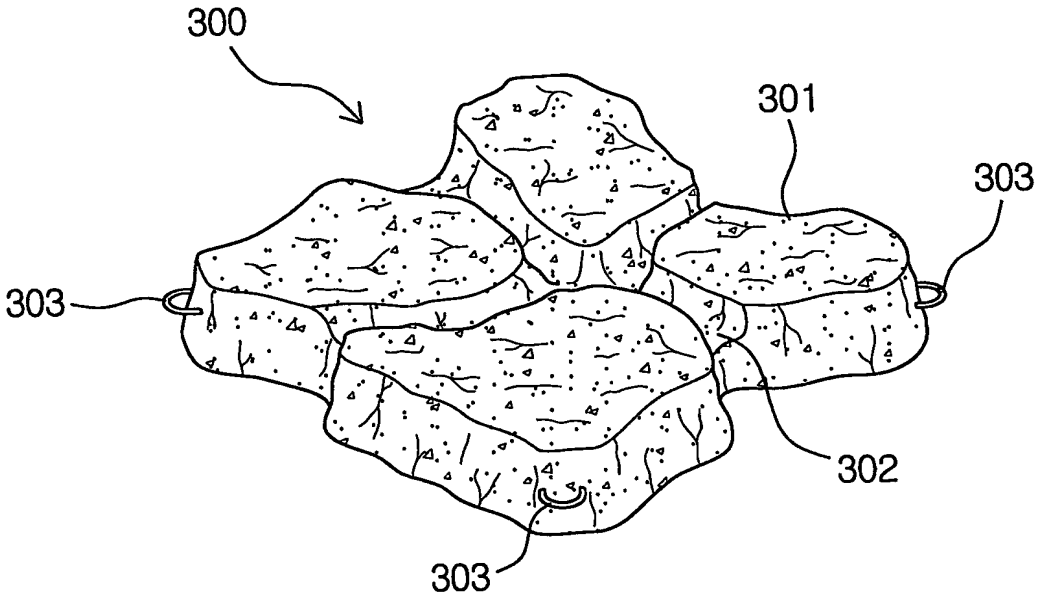


Fig.4

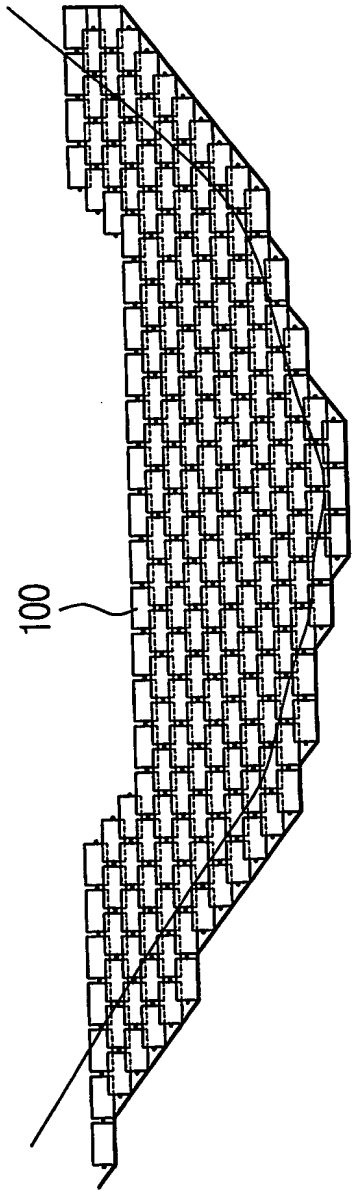


Fig.5

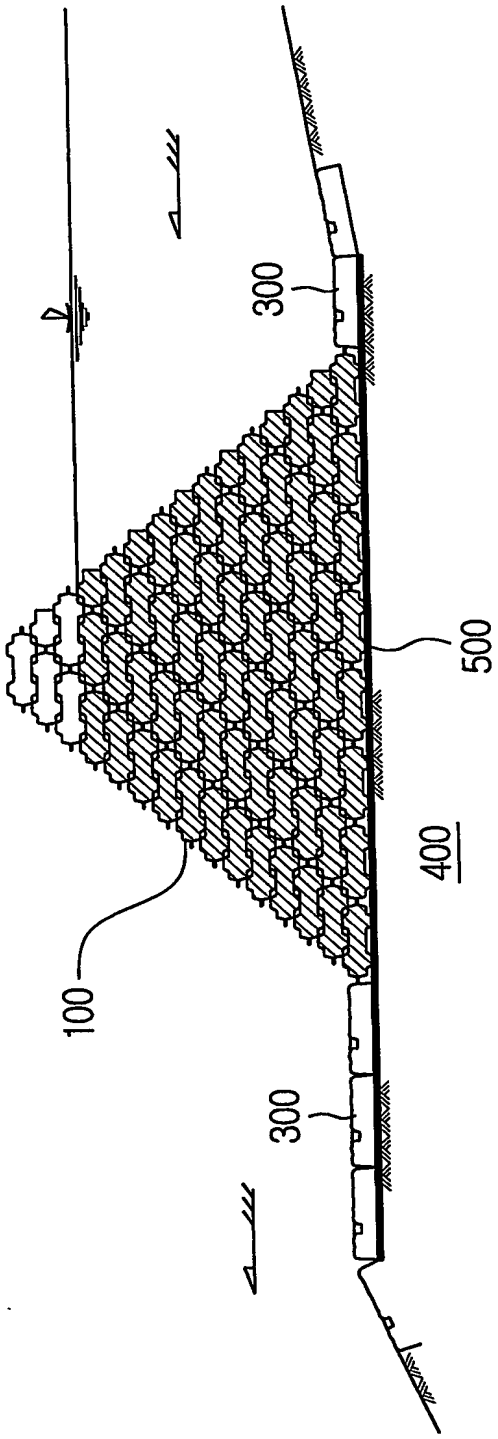
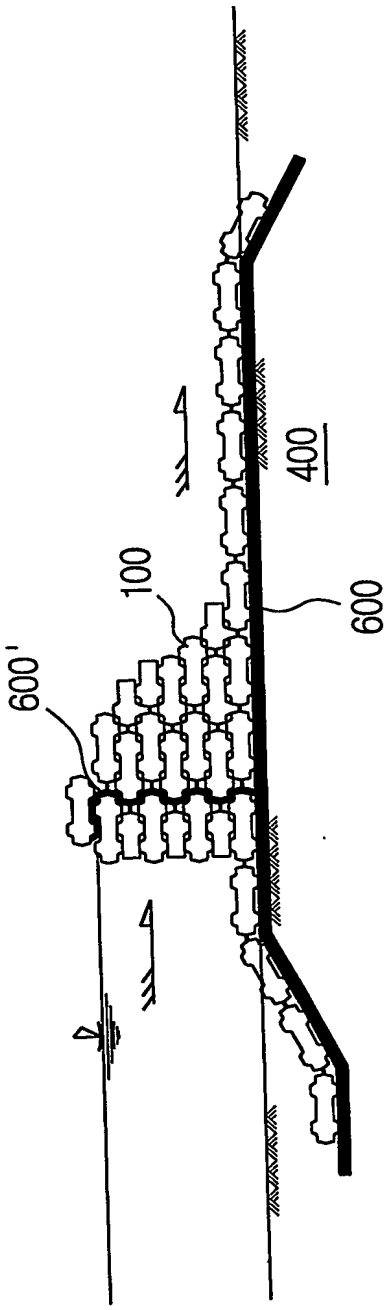


Fig.6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR02/00723

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 E02B 3/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 E02B, E02D, E01C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR, JP, US IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10 - 1998 - 2464 (Keun Hee Lee) 30 MARCH 1998 See the whole document	1 - 5
A	KR 10 - 2001 - 44084 (Keun Hee Lee) 5 JUNE 2001 See the whole document	1 - 5
A	JP 07 - 82720 (Kankyo Kogaku KK) 28 MARCH 1995 See the whole document	1 - 5
A	JP 06 - 26021 (Kyowa Concrete Kogyo KK) 1 FEBRUARY 1994 See the whole document	1 - 5
A	US 4227829 (Kossuth J. Landry, Jr) 14 OCTOBER 1980 See the whole document	1 - 5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
09 DECEMBER 2002 (09.12.2002)	09 DECEMBER 2002 (09.12.2002)

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	CHOI, Woo Joon Telephone No. 82-42-481-5794

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR02/00723

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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KR 10 - 2001 - 44084	05 - 06 - 2001	KR 10 - 1999 - 51412	13 - 11 - 99
JP 07 - 82720	28 - 03 - 95	NONE	
JP 06 - 26021	01 - 02 - 94	NONE	
US 4227829	14 - 10 - 80	NONE	